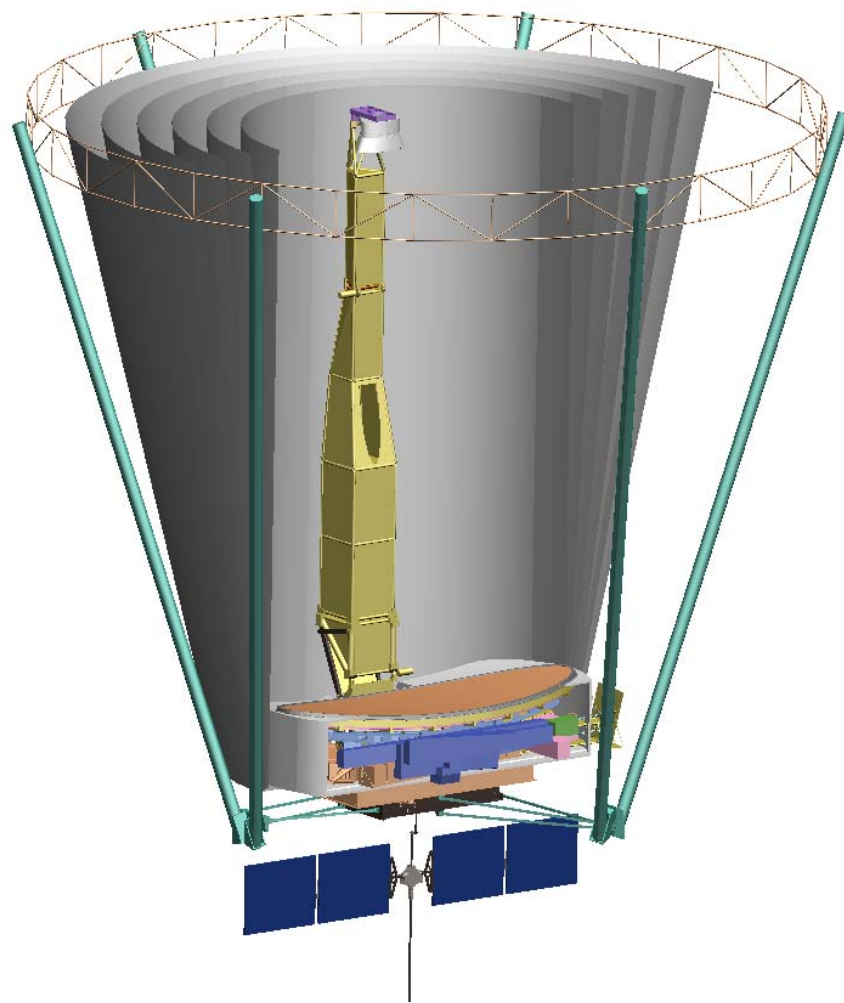




Payload System Description

Virginia Ford

Solids pictures courtesy of Tim Ho





Payload System Concept Status



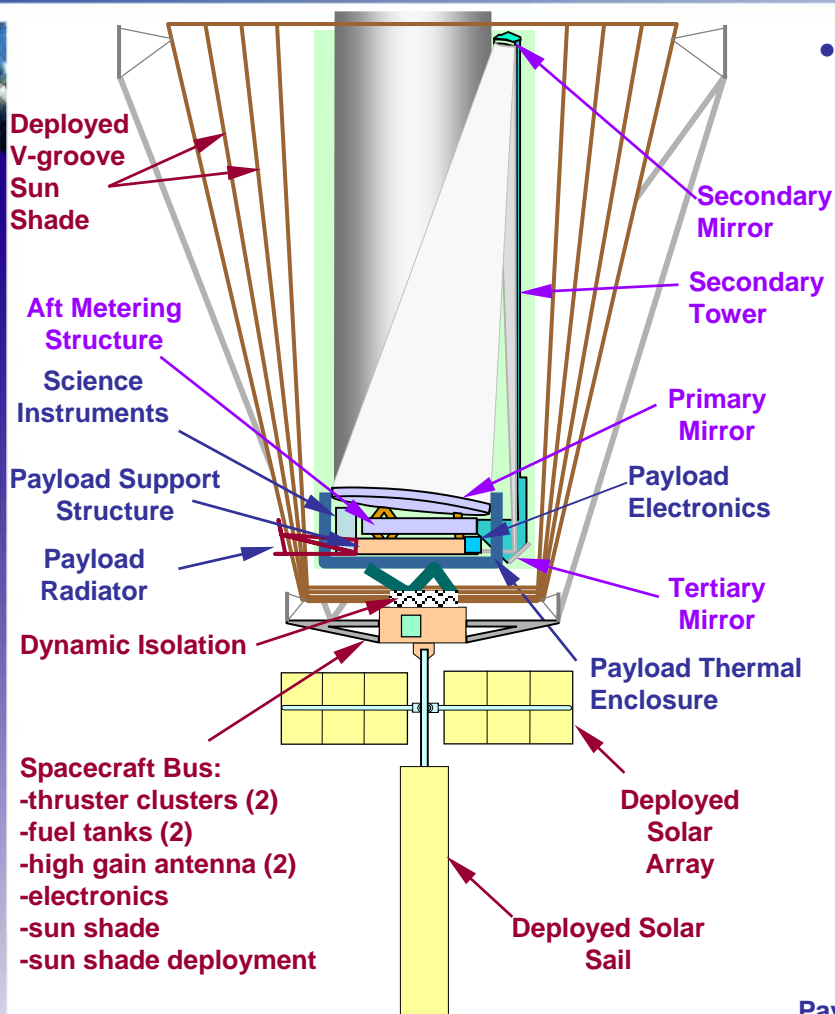
TPF
Terrestrial Planet Finder

- Goal of Mission Concept Development:
 - Demonstrate feasibility of a mission that meets core science needs
 - There are technical challenges
- Presentation of a Developing Concept – work in progress
 - Instrument Concept Studies will help define the final approach
 - Place holder instruments do not represent preferences for final instruments - are used to aid in determining observatory capability
- There are limitations and constraints: ie
 - Launch mass and shroud volume
 - Starlight suppression stability requirements
 - Time and resources

Payload Mechanical Interfaces

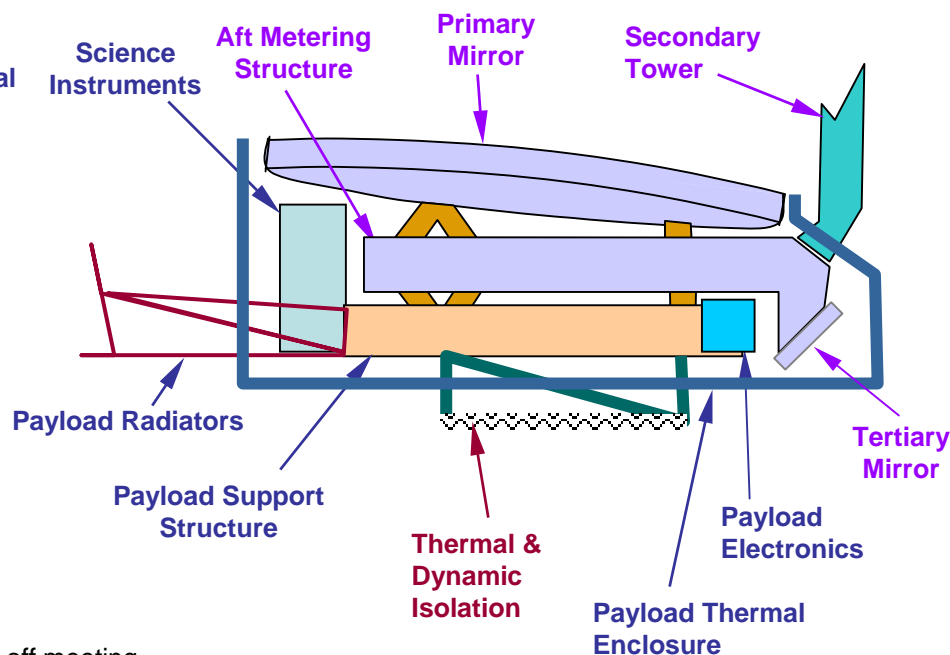


TPF Terrestrial Planet Finder



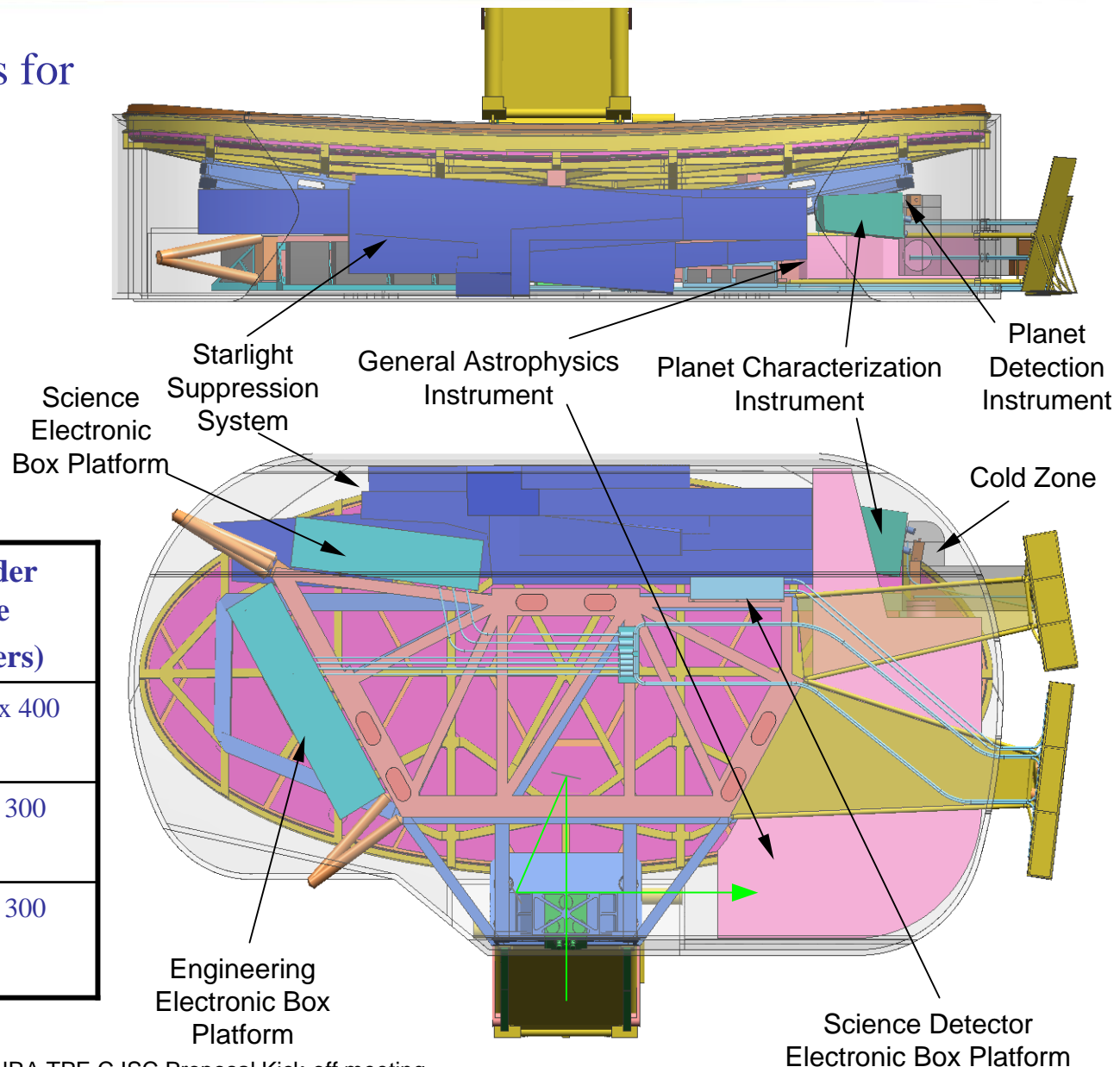
KEY
 Spacecraft
 Telescope
 Other Payload

- Payload Support Structure
 - Mounts to Spacecraft through thermal and dynamic isolation components
 - Supports:
 - Telescope Assembly Science Instruments
 - Payload Radiators
 - Payload Electronics
 - Isothermal Enclosure



Placeholder Science Instrument Locations

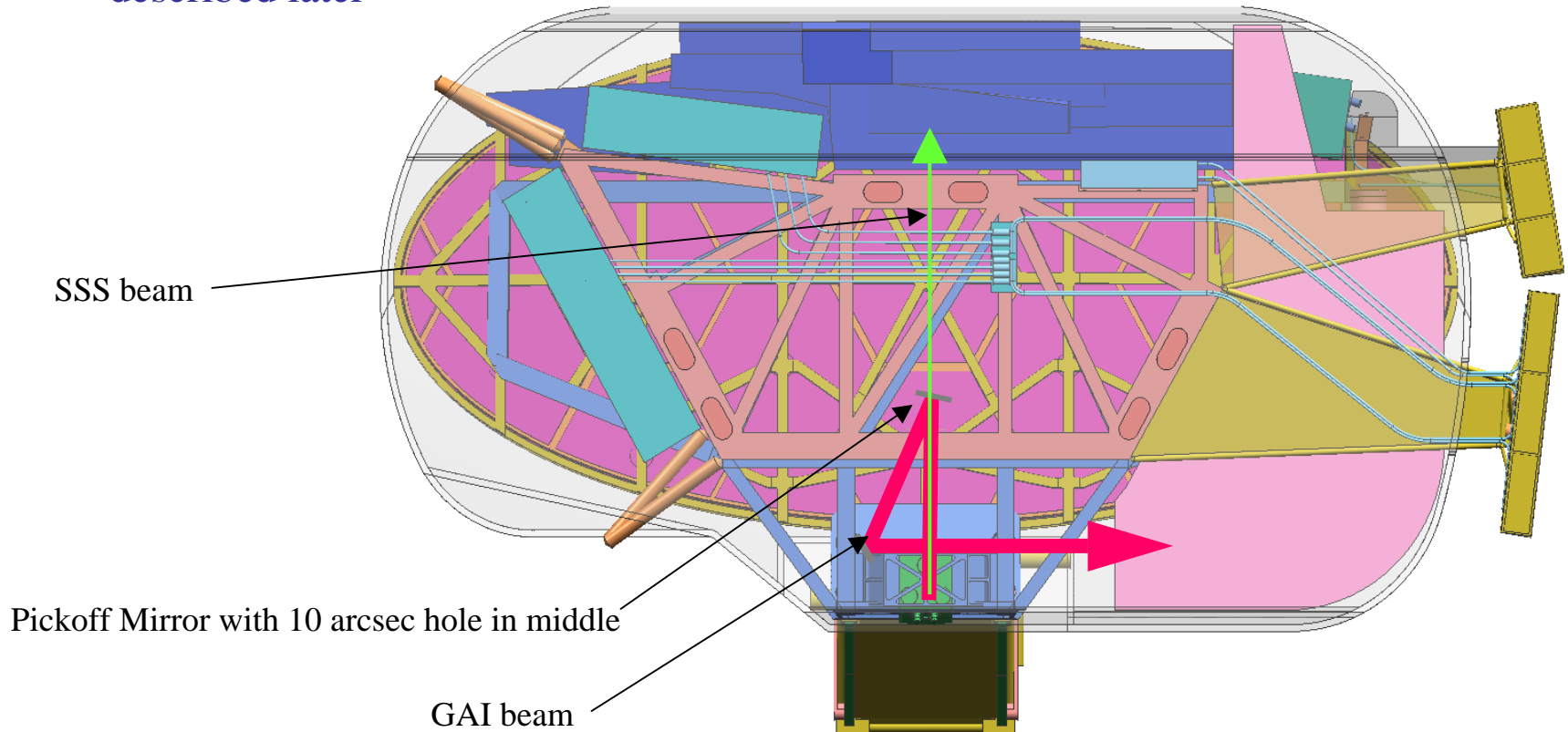
- Not preferred choices for instrument concepts
- Used to understand accommodation requirements



Placeholder Instrument	Placeholder Volume (millimeters)
General Astrophysics Instrument	2250 x 1400 x 400
Planet Detection Camera	325 x 400 x 300
Planet Characterization Instrument	750 x 400 x 300

Science Instrument optical paths

- From tertiary mirror of telescope, a pickoff mirror sends :
 - Outer portion of the beam to the GAI (assumed 10 arcsec – 4 arcmin)
 - Beam height limitation for GAI: 30 cm
 - Inner portion of the beam to the SSS
 - Light delivered to detection and characterization instruments through SSS described later



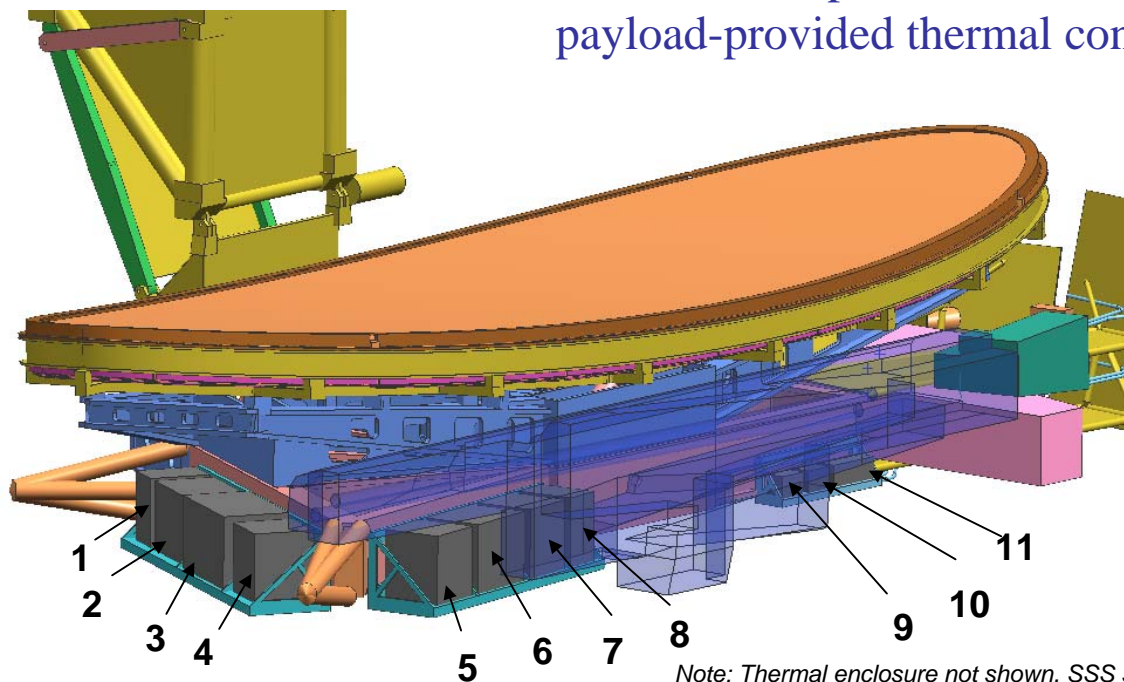


Payload Computing and Electronics Philosophy

Assumed Electronic box sizes: (W x H x L) cm

- 1) OTA MCE - 36 x 38 x 24
- 2) Payload System Elex - 36 x 38 x 48
- 3) Laser Metrology - 40 x 40 x 68
- 4) OTA Thermal Control - 36 x 38 x 38
- 5) Planet characterization - 36 x 38 x 36
- 6) Planet detection - 36 x 38 x 48
- 7) Fine DM controller - 36 x 38 x 36
- 8) GAI - 36 x 38 x 24
- 9) Planet Detection Detector electronics-
12 x 12 x 18
- 10) Planet Characterization Detector electronics-
12 x 12 x 18
- 11) GAI Detector electronics- 12 x 12 x 36

- Instruments responsible for science data computing including data compression
- Spacecraft will provide data storage and downlink
- All instrument electronics mounted on payload side to minimize cabling stiffness (thus dynamic perturbation exchange)
- Instrument electronics not required to be co-located with optics assemblies mounted on payload-provided thermal control plate



Payload Thermal Control

- Isothermal Enclosure surrounds warm portion of payload:
 - 290K – 305K
- Cold zone enclosing detectors isolated from warm zone:
 - assumed temperature: $-100\text{C} \pm 5\text{C}$

Placeholder Detector	Cooling power (assumed)
GAI	12 Watts
Detection	5 Watts
Characterization	8 Watts

